promising opposition of 1877; when, if the seasons on both planets are as favourable as their mutual proximity, we may reasonably expect some advance to be in store for us. The great object will naturally be the identification of the dark spots, as well as a more careful delineation of their boundaries: attention will doubtless be paid towards obtaining a definitive value for the rotation; but in this direction progress is not very material, as we have already a sufficient approximation. Those who would see an extraordinary instance of the most painstaking and protracted efforts to get rid of a trifling uncertainty may apply themselves to the 23 pages of Kaiser, in which all kinds of varied combinations are tried to reconcile some conflicting decimals of a second, for to these the question is reduced at last. Cassini, as far back as 1666, had fixed the rotation at 24h. 40m. with surprising correctness for his day. Herschel I. brought it to 24h. 39m. 21·67s. but, as Beer and Mädler perceived, the omission of one rotation, and of the effects of phasis and aberration, vitiated the result. They in turn gave 24h. 37m. 23·7s. Kaiser, from many elaborate comparisons, deduced a mean of 22·62s., but Proctor having found a value of 22·735s. the former, who thought the English astronomer's coincidences illusory, went into the whole subject afresh with marvellous minuteness, and got out a final mean of 22·531s., discovering by the way some unexpected inaccuracies, convincing himself that the correctness of the best drawings has been greatly over-rated, and finally, in much mortified perplexity, leaving it to every one to choose his own combination. No computation, he says, can make us sure to the hundredth of a second; and unless observations become very much more precise, it will be several centuries before such a result will be obtained: how much the wiser mankind would be for it, is another question, which we need not discuss here. But there is, perhaps, no great difficulty in divining the cause of the Professor's troubles. Epochs of rotation could only be safely taken from drawings made with that special object, and few such probably exist; the designer usually either contenting himself with a general likeness, or being occupied about details, the study of which would of itself render him less attentive to mere position. In future, these objects might be better separated; and while the artist busies himself with the *minutiæ* of the picture, the rotation-seeker should employ himself exclusively in estimating the co-ordinates of some conspicuous points—a process which admits of a mean taken between many proportional valuations.

Several other desirable matters of inquiry will readily offer themselves. Measures of ellipticity have as yet yielded only contradictory results. The inclination of the axis, last deduced by Oudemans in 1852, may be susceptible of correction; and the excentric position of one or both of the snow-spots, and the unsymmetrical position of the isothermal poles, would be matters of interesting investigation. The amount of the latter deviation, first measured by the elder Herschel, has been given so very differently by different observers, even at the same opposition, that it evidently is open to fresh determination. The well-known colours will of course catch the eye; and attention may be paid to the question whether the green, or as others think blue, tint of the dark parts (which Kaiser saw as grey only) is really, as Herschel II. implies, the mere result of contrast. The effect may be possibly thus heightened; but no one who saw one of the great seas as the writer did with a 9in. silvered speculum on April 4, 1871, could doubt the independent existence of a beautiful clear blue-grey tint, the more certain as a shading on another part of the disc was of a brownish hue: nor does it seem to have been noticed that no effect of contrast has been traced in the polar snows. The luminous and occasionally coloured patches and segments on the limb should receive attention, and the position of "Dawes' ice-island" be scrutinised; such a brilliant speck I witnessed at the above epoch, but I believe in another situation. Black points should be looked for, as such have been detected by Mitchell and Dawes; and it should be noted at the time of any conspicuous feebleness of the markings, whether the sharpness of the limb indicates the cause to be further distant than our own atmosphere: and in general the "daily—nay, hourly—changes in the detail and in the tones of the different parts of the planet, both light and dark," described by Lockyer, should be carefully watched and recorded;

"In tenui labor;"

nevertheless, none of these little matters will be considered insignificant by those who love to behold in such things the footsteps of Creative and Upholding Power.

T. W. WEBB

NOTES

WE have received some interesting notes of the work done by the eminent Russian explorer, Dr. von Miclucho-Maclay, which we hope to publish next week. Contrary to the advice of everyone, this intrepid traveller and true devotee of Science is determined upon again visiting the east coast of Papua. When his researches here are complete he intends to visit some of the islands of Polynesia and certain parts of the coast of Australia. This, he calculates, will take up five or six years. The Governor of the Dutch East Indies, like a true man of Science, had given Dr. Maclay, for the last six months, roomy and comfortable quarters in his palace at Buitonrovg. It would be well if all in high position would imitate this kind of "patronage."

THE Meteorological Committee of the Board of Trade have resolved to commence the issue of lithographed copies of the twenty-four hourly tabulated readings, taken at their seven observatories, for every element which is observed continuously, commencing with January 1, 1874. The sheets will be issued quarterly, and the issue will be a limited one. The subscription for a copy is 1*l.* per annum, to cover a portion of the expense of production. The sheets will not be distributed with the publications of the office.

M. L. QUETELET, the founder and director of the Brussels Observatory, died in Brussels on Monday night, aged 77. He leaves a son, M. Ernest Quételet, who inherits the scientific enthusiasm of his father.

THE letter which has been received from Consul Prideaux, and the extract from Cameron's letter published in the *Academy*, adds but little to the details we gave some time ago concerning Livingstone's reported death. Lake Bemba is identified by Consul Prideaux as Lake Bangweolo, and a letter from the Arab Governor of Unyanyembe fixes the spot where the great traveller died at Lobisa. A letter to Dr. Petermann from the German African traveller and Austrian Consul at Zanzibar, Mr. Richard Brenner, merely repeats the statements already known. Dr. Kirk, under date Feb. 12, writes to the *Academy* as follows:—"This morning I have heard indirectly from Zanzibar, and find people there who could judge, still question the truth of the story ot Livingstone's death. Like us, they see nothing but native report to base it on." Let us hope that this is the real state of the case. As Zanzibar and Ujiji are at present at peace it is expected that there will be no difficulty in getting the Doctor's valuable journals. It is gratifying to see from Mr. Markham's letter in yesterday's *Times* that through Sir Samuel Baker's determined energy, the route to Zanzibar has been virtually opened up from the north.

THE letter above referred to from Consul Brenner, states that a German botanist, M. Hildebrand, has been preparing, for a year past, to undertake a journey into the interior of the Galla country and Somali Land.

A SHORT course of Lectures on the Growth of Physical Science during the last twenty-five years, is to be given at the request of a number of gentlemen in Edinburgh, in St. George's Hall, by Prof. Tait, of the University of Edinburgh. The first lecture is to be given to-day.

AT the Annual General Meeting of the Glasgow Geological Society, on Thursday last, Sir William Thomson gave an address on "The Influence of Geological Changes on the Earth's Rotation." We hope to be able, very soon to give an abstract of this address.

THE *Times* announces that the following arrangements have been made in consequence of Mr. Henry Cole's retirement last year from the post of Secretary of the Science and Art Department and Director of the South Kensington Museum:—Sir Francis Sandford, Secretary of the Education Department, will also be Secretary of the Science and Art Department; Major Donnelly, R.E., Official Inspector for Science, will be Director of Schools of Science and Art and affiliated institutions; Mr. Norman MacLeod will remain Assistant Secretary of the Science and Art Department; and Mr. Philip Cunliffe Owen, Assistant Director of the South Kensington Museum, will be the Director of that Museum.

PROF. HELMHOLTZ has communicated to the Academy of Sciences of Berlin a paper on "The Direction of Balloons," in which he enters into a number of elaborate calculations. In his calculations he directs attention only to the relation between the force and the weight, and supposes that the means at our disposal will enable us to construct the envelope of the balloon and its motive power. But, Prof. Helmholtz says, "it appears to me that here there exists a great difficulty in the way of execution, for the solid parts of the machine do not preserve the necessary solidity when they are much enlarged, although they continue to be geometrically similar; they then must be made thicker, and consequently heavier. To obtain the same effect with small motors at great speed, there is a loss of work. We can only work economically then with motors of large surface urged by a motion relatively slow. One of the great practical difficulties will then be to obtain the necessary dimensions without overloading the balloon."

PROF. H. A. NEWTON thus criticises the Report of the British Association Committee on Units in the March number of *Silliman's Journal*:—The *dyne* or unit of force which is proposed by the committee is to be a new unit of the same nature as a gram-weight, or the earth's attraction for a gram-mass, and having no commensurable ratio with it. Now our simplest and most useful ideas of force are derived at once from weight. It seems to us that, of necessity, this will always be the case. Probably the learned committee have no expectation that even among scientific men the new units will entirely replace what they call the vulgar ones. If, then, their recommendation is accepted, we shall create for certain departments of mechanical science new units of force and energy which are in no useful ratios to those used in other departments of science, and by people at large. Is there not some way of avoiding this great evil? Societies are formed and sustained whose main and most worthy object is to get rid of such confusions. We think the proposed units should be stoutly challenged to show a necessity for their being. We do need, it may be added, a new *name* for the earth's attraction upon a gram of matter at some fixed place. The words *gram, pound, ton*, &c., have had to do service in two different senses, that is, as mass, and as force. If any good word could come into use that shall express the earth's attractive force for a gram of matter at some place that may be agreed upon, it would meet a real want.

THE collection of Humming Birds of the late M. Jules Bourcier is to be sold by auction at Paris on March 2. M. Bourcier's collection of these birds was, a few years ago, the best and most complete in existence, embracing numerous types of the species described by the French naturalists, and specimens collected by himself during his residence in Ecuador as French Consul.

MR. A. S. NAPIER, of Owens College, Manchester, who has been elected to a Natural Science Scholarship at Exeter College, Oxford, received the first part of his science training at Rugby. Mr. W. E. Hoyle, of Owens College, has been elected to a Natural Science exhibition in the same College.

THE Japanese Government have, through their Legation in London, appointed Mr. R. Routledge, B. Sc., F.C.S., to the Professorship of Chemistry and Physics in the Imperial College at Yeddo. Mr. Routledge was formerly of the Owens College, Manchester, where he studied Chemistry under Dr. Roscoe, and afterwards took high honours at the University of London.

WE gladly call attention to the action taken by the British Association, "Boulder Committee," under its secretary, the Rev. H. W. Crosskey. A large printed form has been prepared, with a set of well-drawn up questions, and spaces for the answers of those who may be inclined to assist the Committee in their praiseworthy work. Copies of this form may be obtained by applying to Mr. Crosskey, 28, George Road, Birmingham.

A TELEGRAM from Cairo announces that Dr. Beke has succeeded in discovering the true Mount Sinai. It is said to be situated one day's journey west of Akaba, is called by the Arabs the Mountain of Light, and is 5,000 ft. high. On the summit were some sacrificial remains of animals.

MISS FRANCES STRICKLAND, of Appleby-court, Tewkesbury, has offered to found at the University of Cambridge a curatorship of the Ornithological collection formerly belonging to her brother, Mr. H. F. Strickland, F.R.S., and presented to the University in 1867 by his widow. Miss Strickland proposes to endow the office with a permanent stipend of 150*l.* per annum. The principal conditions attached to the gift are that the curator be appointed by the foundress during her lifetime, and afterwards by Mrs. Catherine Strickland, and, on the decease of these two ladies, by the superintendent of the University Museums of Zoology and Comparative Anatomy, but in each case with the consent of the Vice-Chancellor. That the curator is to be subject to the authority of the superintendent of the museums, and that his first duty be the proper custody and efficient preservation of the Strickland collection, making an accurate catalogue of it, so that the collection be of the greatest service to Science. He would be required to reside in the University; and in case of the abolition of the office of superintendent of the museums the curator shall be appointed and removed by the Professor of Zoology and Comparative Anatomy with the consent of the Vice-Chancellor. The Council of the Senate recommend the acceptance of Miss Strickland's liberal offer.

ON this day week there passed from among us a countryman whose power has been but too little appreciated, and far too little recompensed by ourselves or other European nations. Sir Francis Pettit Smith was, to all intents and purposes, the discoverer of the screw-propeller, a method of progression as practically advantageous as it is theoretically perfect; nevertheless, the benefits which he has derived from his indebted countrymen are but a paltry annuity and an equally insignificant decoration. Considering the little encouragement given by our Government for first-class work, it is really a matter of surprise that any should be produced at all.

At the meeting of the Academy of Sciences at Paris, on Feb. 9, the candidates to be recommended to the Minister of Public Instruction for the chair of Comparative Embryogenesis at the College of France, were balloted for. The names of MM. Gerbe, Balbiani, and Dareste, were presented to the meeting, and the result of the voting was to select the two former gentlemen as the Academy's nominees for the post.

Captain S. P. Oliver writes us concerning a meteor-cloud which he observed at Buncrana, Co. Donegal, on Feb. 5, at about 9.10 P.M. local time. He saw what he at first thought to be a comet's tail, viz. a broad band of silvery white and luminous cloud extending in an arc from S.E. by E. to N.W. by W., as near as he could judge, from horizon to horizon, but tapering towards the extremities. The apex of this arc, which was some four or five degrees in width, was as nearly as possible on the meridian at about 80° elevation from the horizon. The band passed within three or four degrees above the upper stars of Orion. Through this luminous cloud the stars shone brightly. The edges appeared well-marked, and there was no appearance of that serpentine track into which meteor-clouds frequently dissolve. Several "shooting-stars" were visible the same evening. One especially he noticed which seemed to come from a radiant point at the S.E. extremity of the above-named cloud.

Messrs. Smith, Elder, and Co. have a new edition of Mr. Charles Darwin's work on the "Structure and Distribution of Coral Reefs" in preparation.

Michelet, the celebrated historian, who died within the last few days at Cannes, aged 76 years, has written a few sensational books on natural history. "L'Oiseau" and "L'Insecte," had an immense circulation, although their real scientific value was very small.

M. Reinwold, one of the largest Parisian scientific publishers, is just publishing a translation of Haeckel's "History of Creation." It is prefaced by M. Charles Martin, one of the most celebrated correspondent members of the French Institute. Consequently Darwinism is not to be considered as having been extinguished in France by the last rejection of Darwin by the Academy. Neither will the success of Haeckel's great work be paralysed by the cry of *no more Germanism* raised in certain quarters.

Capt. Mouchez, who has been appointed the chief astronomer for St. Paul's station on the Venus Transit Expedition, is publishing, at the expense of the French Admiralty, a map of the Algerian coast on the scale of $\frac{1}{120000}$. The survey was executed on a new plan and only lasted 18 months. Although Algeria extends about 750 miles east-west, M. Mouchez has determined all his stations by a series of triangulations executed on shore, independently of the situation of his boats or ships.

For some years past much interest has been excited in the United States in reference to the erection of a large telescope, and possibly a complete astronomical observatory on the high portion of the Rocky Mountains. As preliminary to this, a number of careful examinations have been made of the optical qualities of the atmosphere in various portions of the Western country. Of these special interest attaches to the expedition of Professor Davidson of the Coast Survey, whose report to the California Academy of Sciences, states that the meteorological tables kept at Summit Station, on the Sierra Nevada, 7,042 feet above the sea, during the year ending November 1867, show that out of 358 days and nights only eighty-eight were cloudy, nearly all of these occurring in the winter months, during which the snowfall was about forty-five feet, the winter not being unusually mild. The summer weather is very pleasant, the nights cool, and the atmosphere wonderfully clear. The mountain flanks are covered with verdure during the summer, and there is freedom from great clouds of dust. Prof. Davidson says that, owing to the steadiness of the atmosphere, observations at this elevated point would in one or two nights be of greater value than the results of six months' observations at lower stations. Higher and perhaps more desirable positions exist in the immediate neighbourhood of Summit Station; and the interest excited by Prof. Davidson's report probably has, to a considerable extent, influenced the determination announced in a recent letter of Mr. J. Lick, the well-known millionaire of San Francisco. This gentleman has indicated in a letter to the California Academy of Sciences, and again in a letter to Prof. Joseph Henry, his desire to establish an observatory in the best possible location, and provide it with the largest and finest astronomical instruments. He proposes to this end to set aside one million dollars as a permanent endowment fund. This is a monument and a renown which few are rich and wise enough to achieve for themselves, and it is greatly to be hoped that the founder of the Lick Observatory may live to enjoy the congratulations of his State and country.

Prof. James Orton, of Vassar College, N.Y., has just returned to the United States from South America, where he has been engaged in a second exploration of the Amazons. The general object of his recent travels in South America, was to supplement his expedition in 1867, when he crossed the continent from west to east, *viâ* Quito and the Nipo wilderness. His route in 1873 was up the Amazons from Para to Yurimaguas on the Hoallaga River; thence up to the Paravapura and its tributary, the Cachiyeen to Balsa Puerto; thence over the Icuto Vange on foot to Moyobamba; thence across and among the Andes to Chachapoyas and Cayamarca, crossing the Upper Mavañon, or Balsas, and striking the coast at Pacasmayo; thence to Lima and its immediate region; thence to Mollendo, Areguipa and Puno on the shore of the Lake Titicaca. He was the first traveller to pass from the Pacific to the Lake by the railway just finished by Mr. Meiggs. The prime object of his explorations was to study the physical geography, geology and topography of the Amazons. On these points he obtained a vast amount of new and reliable information. He found that the Upper Amazon (Marañora), has been grossly misrepresented in all the more recent maps of Peru. He made everywhere, but especially in Northern Peru, large collections in natural history, to throw light upon the distribution of animal life. Prof. Orton will condense the results of his expedition in a work on the Physical Geography, Natural History, and Commercial Resources of the Valley of the Amazons.

Fresh advices to January 11, received from the German exploring expedition in the Lybian Desert, under Gerhard Rohlfs, announce that the expedition had reached the important oasis of Dachel, containing 17,000 inhabitants. Valuable geographical discoveries had been made, and six maps of the country had been taken.

The metrical system has just been adopted in Germany for the measurement of distances. The official papers have published the order with decrees that henceforth the kilometre shall replace the Prussian mile.

The additions to the Zoological Society's Gardens during the past week include a pair of Coatis (*Nasua nasica*) from South America, presented by Mr. W. P. Chambers; an Egyptian Fox (*Canis niloticus*) from Port Said, presented by Mr. J. T. Keane; a Bonnet Monkey (*Macacus radiatus*) from India, presented by Mr. R. Wilkinson; a Great Kangaroo (*Macropus giganteus*), born in the Gardens; five Branched Sea Horses (*Hippocampus ramulosus*) from the coast of France, purchased; a Capybara (*Hydrochœrus capybara*) from Rio Negro.